

CLAIMS

Having thus described the aforementioned invention, we claim:

1. A cancer detection system for mapping breast tissue to detect localized tissue abnormalities and for constructing a chronological profile of a patient's tissue to detect the development of cancerous tumors, said system comprising:

a garment adapted to fit over at least one breast;

a plurality of sensors mounted on said garment, said plurality of sensors including at least one transmitter and a plurality of receivers, each of said plurality of sensors having a surface adapted to be in direct contact with said at least one breast, said plurality of sensors being ultrasonic; and

a processing device in communication with said plurality of sensors, said processing device controlling said at least one transmitter, said processing device acquiring and storing data received from said plurality of receivers.

2. The system of Claim 1 wherein said garment is a bra-type garment.

3. The system of Claim 1 wherein each of said plurality of sensors include a coupling agent, said coupling agent forming said surface, whereby said coupling agent provides connectivity between said sensors and said at least one breast.

4. The system of Claim 1 wherein said plurality of sensors are ultrasonic transceivers.

5. The system of Claim 1 wherein said plurality of sensors are piezoelectric.

6. The system of Claim 1 wherein said processing device includes a local processing device in communication with a remote processing device, said local processing device acquiring said data and said remote processing device storing and processing said data.

7. The system of Claim 1 wherein said processing device processes said data using amplitude analysis and time-of-flight analysis of a signal sent directly from said at least one transmitter to at least one of said plurality of receivers.

8. The system of Claim 1 wherein said processing device constructs a
5 chronological profile corresponding to a plurality of breast examinations.

9. The system of Claim 9 wherein said processing device references said chronological profile in order to compensate for differences in a position of said garment relative to said at least one breast.

10. A cancer detection system for ultrasonically mapping breast tissue to
10 detect localized tissue abnormalities and for constructing a chronological profile of a patient's tissue to detect the development of cancerous tumors, said system comprising:

a means for positioning a plurality of sensors about a breast;

a means for acquiring data by utilization of said plurality of sensors; and

15 a means for processing acquired data.

11. The system of Claim 10 wherein said means for positioning is a garment worn by the patient.

12. The system of Claim 10 wherein said plurality of sensors is a plurality of ultrasonic transceivers.

20 13. The system of Claim 10 wherein said means for processing includes a processor for analysis of a plurality of amplitude and time-of-flight of signals received by said plurality of sensors.

14. The system of Claim 10 wherein said means for processing does not include analysis of backscattered signals.

15. The system of Claim 10 wherein said means for processing includes a processor for constructing a chronological profile corresponding to a plurality of examinations.

16. A cancer detection system for ultrasonically mapping breast tissue to
5 detect localized tissue abnormalities and for constructing a chronological profile of a patient's tissue to detect the development of cancerous tumors, said system comprising:

a plurality of transmitting sensors adapted to be positioned about a breast;

a plurality of receiving sensors adapted to be positioned about a breast; and

10 a processing device in electrical communication with said plurality of transmitting sensors and said plurality of receiving sensors, said processing device sensitive to a time-of-flight of a plurality of signals transmitted from said plurality of transmitting sensors and received by said plurality of receiving sensors, said processing device sensitive to an amplitude of said plurality of signals.

15 17. The system of Claim 16 wherein each of said plurality of transmitting sensors is an ultrasonic transmitter.

18. The system of Claim 16 wherein each of said plurality of receiving sensors is an ultrasonic receiver.

19. The system of Claim 16 wherein each of said plurality of receiving
20 sensors and each of said plurality of transmitting sensors is an ultrasonic transceiver.

20. The system of Claim 16 wherein said processing device constructs a chronological profile corresponding to a plurality of examinations.

21. The system of Claim 16 wherein said processing device detects the
25 presence of a localized tissue abnormality by analyzing a time-of-flight and an amplitude of said plurality of signals.

22. A cancer detection method for ultrasonically mapping breast tissue to detect localized tissue abnormalities and for constructing a chronological profile of a patient's tissue to detect the development of cancerous tumors, said method comprising the steps of:

- 5 a) transmitting an ultrasonic signal from a transmitter through a breast, then;
- b) receiving said ultrasonic signal by an array of receivers positioned on an opposite side of said breast relative to said transmitter;
- c) analyzing received ultrasonic signal in terms of signal amplitude; and
- 10 d) analyzing received ultrasonic signal in terms of signal time-of-flight;

whereby said signal amplitude analysis and said signal time-of-flight analysis indicate the presence of a localized tissue abnormality.

23. The method of Claim 22 further including the step of performing a background noise test prior to said transmitting step a).

15 24. The method of Claim 22 further including the step of performing a distance test prior to said receiving step b).

25. The method of Claim 24 wherein said distance test includes determining a time-of-flight value such that an initiation and duration of sampling a received signal can be calculated.

20 26. The method of Claim 22 further including the step of constructing a chronological profile corresponding to a plurality of examinations.